



## What is claimed is:

**[Claim 1]** A topical Matrix Metalloprotease Inhibitor (MMP) composition comprising; (i) At least one hydroxyaryl or polyhydroxyaryl compound that contains an alkyl carbon side chain with a ketone group attached at the first carbon atom of the alkyl side chain, and said ketone group is directly attached to the aromatic ring at a position adjacent to at least one hydroxyl group of hydroxyaryl or polyhydroxyaryl ring; or at least one N-hetero-aromatic compound that contains an alkyl carbon side chain with a ketone group attached at the first carbon atom of the alkyl side chain, and said ketone group is directly attached to the nitrogen hetero-aromatic ring at a position adjacent to the aromatic ring nitrogen atom; or a combination thereof; and (ii) A cosmetically or pharmaceutically acceptable topical delivery system or carrier base composition.

**[Claim 2]** A composition according to claim 1, wherein hydroxyaryl compound is selected from hydroxy or polyhydroxy acetophenones, or hydroxy or Polyhydroxy propiophenones, and their substituted derivatives.

**[Claim 3]** A composition according to claim 1, wherein-hetero-aromatic compound is selected from 2-acetyl-substituted N-hetero-aromatic compounds.

**[Claim 4]** A composition according to claim 1, wherein hydroxyaryl compound is selected from oxime, or hydrazide, or semicarbazone, or oxamic hydrazone derivatives of hydroxyaryl- or polyhydroxyaryl alkyl ketones.

**[Claim 5]** A composition according to claim 1, wherein N-hetero-aromatic compound is selected from oxime, or hydrazide, or semicarbazone, or oxamic hydrazone derivatives of N-hetero-aromatic alkyl ketones.

**[Claim 6]** A composition according to claim 1, wherein hydroxyaryl compound contains additional cyclic rings attached at the aromatic ring.

**[Claim 7]** A composition according to claim 1, wherein N-hetero-aromatic compound contains additional cyclic rings attached at the nitrogen hetero-aromatic ring.

**[Claim 8]** A composition according to claim 1, wherein N-hetero-aromatic compound contains additional hetero-atoms in same ring that contains nitrogen hetero-atom; or in other cyclic ring or rings that are attached to the nitrogen hetero-aromatic ring.

**[Claim 9]** A composition according to claim 1, wherein the cosmetically or pharmaceutically acceptable delivery system can be traditional water and oil emulsions, suspensions, colloids, microemulsions, clear solutions, suspensions of nanoparticles, emulsions of nanoparticles, powders, or anhydrous compositions.

**[Claim 10]** A composition according to claim 2, wherein hydroxy or polyhydroxy acetophenone compound is selected from 2-hydroxyacetophenone, 3-hydroxyacetophenone, 4-hydroxyacetophenone, 2,3-dihydroxyacetophenone, 2,4-dihydroxyacetophenone, 2,5-dihydroxyacetophenone, 2,6-dihydroxyacetophenone, 3,4-dihydroxyacetophenone, 3,5-dihydroxyacetophenone, 2,4,6-trihydroxyacetophenone, 2,3,4-trihydroxyacetophenone, 2,3,5-trihydroxyacetophenone, 2,3,6-trihydroxyacetophenone, 2,4,5-trihydroxyacetophenone, 3,4,5-trihydroxyacetophenone, Resacetophenone, 2-Acetyl resorcinol, 4-Acetyl resorcinol, 3,4-Dihydroxyacetophenone, acetyl quinol, Quinacetophenone, 1-(3-Hydroxy-4-methoxy-5-methylphenyl) ethanone, 1-(3-hydroxy-4-methoxyphenyl) ethanone, Paeonol, 5'-Bromo-2'-hydroxyacetophenone, 5'-Chloro-2'-hydroxyacetophenone, 3',5'-Dichloro-2'-hydroxyacetophenone, 3',5'-Dibromo-4'-hydroxyacetophenone, 5-Chloro-3-bromo-2-hydroxyacetophenone, and combinations thereof.

**[Claim 11]** A composition according to claim 2, wherein hydroxy or polyhydroxy propiophenone compound is selected from 2-hydroxypropiophenone, 3-hydroxypropiophenone, 4-hydroxypropiophenone, 2,3-dihydroxypropiophenone, 2,4-dihydroxypropiophenone, 2,5-dihydroxypropiophenone, 2,6-dihydroxypropiophenone, 3,4-dihydroxypropiophenone, 3,5-dihydroxypropiophenone, 2,4,6-trihydroxypropiophenone, 2,3,4-trihydroxypropiophenone, 2,3,5-

trihydroxypropiophenone, 2,3,6-trihydroxypropiophenone, 2,4,5-trihydroxypropiophenone, 3,4,5-trihydroxypropiophenone, 1-(2,4-dihydroxyphenyl)-2-hydroxyethanone, (2-hydroxyphenyl)(oxo)acetic acid, 1-(2,6-dihydroxyphenyl)-1-butanone, 1-(1-hydroxy-2-naphthyl)ethanone, 1-(2-hydroxy-1-naphthyl)ethanone, 5,7-dihydroxy-1-indanone, 1-(2-hydroxy-5-methylphenyl)-1,3-butanedione, N-(4-acetyl-3-hydroxyphenyl)acetamide, 4-acetyl-3-hydroxyphenyl acetate, 1,1'-(4,6-Dihydroxy-1,3-phenylene)bisethanone, 1-(1-hydroxy-2-naphthyl)ethanone, 2,3-Dihydro-9,10-dihydroxy-1,4-anthracenedione, and combinations thereof.

[Claim 12] A composition according to claim 2, wherein oxime, or oxime O-alkyl ether, or hydrazone, or semicarbazone, or oxamic hydrazone derivatives of hydroxy or polyhydroxy acetophenones, or hydroxy or polyhydroxy propiophenones, or combinations thereof, are selected.

[Claim 13] A composition according to claim 2, wherein oxime, or oxime O-alkyl ether, or hydrazone, or semicarbazone, or oxamic hydrazone derivatives of 2-acetyl-N-heteroaromatic, or 2-propionyl-N-heteroaromatic compounds, or combinations thereof, are selected.

[Claim 14] A composition according to claim 3, wherein N-hetero-aromatic compound is selected from 2-acetylpyridine, 2-Acetyl-4-methylpyridine, 1-(1-oxido-2-pyridinyl)ethanone, 2,6-Diacetylpyridine, 3-(Dimethylamino)-1-(2-pyridyl)-2-propen-1-one, 1,8-Diazafluoren-9-one, 2-phenyl-1-(2-pyridinyl)ethanone, 3-phenyl-1-(2-pyridinyl)-2-propen-1-one, 1-(2-pyridinyl)-3-(3-pyridinyl)-2-propen-1-one, 2-hydroxy-1,2-di(2-pyridinyl)ethanone, 1-(2-pyridinyl)-3-(2-thienyl)-2-propen-1-one, 3-(2-hydroxyphenyl)-1-(2-pyridinyl)-2-propen-1-one, 3-(1-oxido-2-pyridinyl)-1-(2-pyridinyl)-2-propen-1-one, 2-acetylpyrrole, 2-Acetyl-1-methylpyrrole, 2-chloro-1-(1H-pyrrol-2-yl)ethanone, 2-(Trifluoroacetyl)pyrrole, 1,4-dihydrocyclopenta[b]indol-3(2H)-one, 2,3,4,9-tetrahydro-1H-carbazol-1-one, (2E)-1,3-di(1H-pyrrol-2-yl)-2-propen-1-one, (2E)-3-phenyl-1-(1H-pyrrol-2-yl)-2-propen-1-one, 2-acetylimidazole, 1-(5-methyl-2-phenyl-1H-imidazol-4-yl)ethanone, 1-(5,6-dimethyl-1H-benzimidazol-2-yl)ethanone, (4-chlorophenyl)(1-methyl-1H-imidazol-2-yl)methanone, (2E)-1-(1H-

benzimidazol-2-yl)-3-(4-pyridinyl)-2-propen-1-one, 1-[1-(4-methylbenzyl)-1H-benzimidazol-2-yl]ethanone, (2E)-1-(1H-benzimidazol-2-yl)-3-(2-fluorophenyl)-2-propen-1-one, (2E)-1-(1H-benzimidazol-2-yl)-3-(2-chlorophenyl)-2-propen-1-one, (2E)-1-(5-chloro-1H-benzimidazol-2-yl)-3-phenyl-2-propen-1-one, 1-[1-(2-chlorobenzyl)-1H-benzimidazol-2-yl]ethanone, (2E)-1-(5,6-dichloro-1H-benzimidazol-2-yl)-3-(4-pyridinyl)-2-propen-1-one, 2-acetylthiazole, 1-(1,3-benzothiazol-2-yl)ethanone, 2-acetylpyrimidine, 2-acetylindole, 2-acetyl-1-methylpyrrole, 2-acetyl-4-methylpyridine, 1-acetylphenothiazine, 2-hydroxy-1-acetylphenothiazine, 8-hydroxy-9-acetylphenanthrene, 2-acetylpyrazine, 1-(3-methyl-2-pyrazinyl)ethanone, 2-acetylquinoline, 2-acetyl-8-hydroxyquinoline, 2-acetyltryptophane, 2-acetyltryptophanamide, 2-acetylpyridine N-oxide, 2-acetylquinazoline, 2-acetylquinoxaline, 3-acetylpyridazine, 6,6'-diacetyl-2,2'-pyridyl, 3-acetyl-1,2,4-triazol, and combinations thereof.

**[Claim 15]** A composition according to claim 4, wherein oxime derivatives of hydroxyaryl compositions are selected from 2-hydroxyacetophenone oxime, 2,3-dihydroxyacetophenone oxime, 2,4-dihydroxyacetophenone oxime, 2,5-dihydroxyacetophenone oxime, Resacetophenone oxime, acetyl quinol oxime, Quinacetophenone oxime, Paeonol oxime, 2-hydroxypropiophenone oxime, 2,3-dihydroxypropiophenone oxime, 2,4-dihydroxypropiophenone oxime, 2,5-dihydroxypropiophenone oxime, 7-acetyl-5,8-dihydroxyquinoline oxime, and combinations thereof.

**[Claim 16]** A composition according to claim 6, wherein hydroxyaryl compound is selected from 1-hydroxy-2-acetylnaphthalene; 1-hydroxy-2-acetyl-5,6,7,8-tetrahydro-naphthalene; 7-acetyl-8-hydroxyquinoline; 3-acetyl-4-hydroxyacridine; 6-acetyl-7-hydroxybenzothiazole, and combinations thereof.

**[Claim 17]** A compound according to claim 8, wherein N-hetero-aromatic compound contains additional hetero-atoms that are selected from N, S, or O, or combinations thereof, in same ring that contains nitrogen hetero-atom, or in other cyclic ring or rings that are attached to the nitrogen hetero-aromatic ring.

**[Claim 18]** A composition according to claim 9, wherein cosmetically or pharmaceutically acceptable topical delivery system or carrier base composition additionally contains hydroxy or polyhydroxy flavones, hydroxy or polyhydroxy coumarins, hydroxy or polyhydroxy isoflavones, hydroxy or polyhydroxy chromanones, and hydroxy or polyhydroxy chromones, and combinations thereof.

**[Claim 19]** A composition according to claim 9, wherein a cosmetically or pharmaceutically acceptable topical delivery system or carrier base composition additionally contains a divalent or a polyvalent metal ion or combinations thereof.

**[Claim 20]** A composition according to claim 9, wherein cosmetically or pharmaceutically acceptable delivery system or carrier base can optionally include additional skin beneficial ingredients selected from skin cleansers, surfactants (cationic, anionic, non-ionic, amphoteric, and zwitterionic), skin and hair conditioning agents, vitamins, hormones, minerals, plant extracts, anti-inflammatory agents, concentrates of plant extracts, emollients, moisturizers, skin protectants, humectants, silicones, skin soothing ingredients, analgesics, skin penetration enhancers, solubilizers, moisturizers, emollients, anesthetics, colorants, perfumes, preservatives, seeds, broken seed nut shells, silica, clays, beads, luffa particles, polyethylene balls, mica, pH adjusters, processing aids, and combinations thereof.

**[Claim 21]** A composition according to claim 19, wherein divalent metal ions are selected from copper, zinc, iron, selenium, vanadium, manganese, and combinations thereof.

**[Claim 22]** A composition according to claim 20, wherein anti-inflammatory agents are selected from Boswellia serrata, Corosolic acid (Banaba), Ursolic acid, Oleanolic acid, Salicinol (Salacia), Rosmarinic acid, Ruscogenins, Darutoside, Asiaticoside, Sericoside, Harpagoside (Devil's Claw), Magnolia Bark (Honokiol, Magnolol), Horse Chestnut (Escin, Esculin), Ginger (Gingerol), Turmeric Extract (Tetrahydrocurcuminoids), Corydalis, Myricetin, and combinations thereof.